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SEP 14 '84

## AGRICULTURAL NOTES

PUBLISHED BY

PORTO RICO AGRICULTURAL EXPERIMENT STATION, MAYAGUEZ  
OFFICE OF FARM MANAGEMENT, FEDERAL BUILDING, SAN JUAN

No. 48 Page 1.

San Juan, Porto Rico, July, 1929.

### GREEN SCALE, COCCUS VIRIDIS, A NEW PEST IN COFFEE AND CITRUS.

By T.B. McClelland, Horticulturist, and C.M. Tucker, Plant Pathologist.

A scale insect until comparatively recently unknown in Porto Rico is causing serious damage to coffee in several sections of the Island. This scale has been identified by the Department of Agriculture in Washington as the green scale, Coccus viridis. So far as we are aware, this is the first published record of its presence in Porto Rico, though the Bureau of Entomology has received records of the occurrence of this scale insect on grapefruit, lime and guava in various localities, including Pueblo Viejo, Guanica, and Vega Baja.

The senior writer's first recalled observance of this scale on coffee was on the Excelsa variety in the Hacienda Semil near Villalba. There Mr. Marvin was spraying against it two years ago and obtaining what he considered at the time satisfactory control. Since then either specimens have been received from or the scale noted in the vicinity of Lajas, Maricao, Mayaguez, Lares and Luquillo.

The San Felipe hurricane caused wholesale destruction of shade trees, exposing the coffee trees to a drier atmosphere, favorable to the development and well-being of scale insects. Under these favorable conditions the scale infestations have prospered and have come notably to the attention of the planters.

The green scale has been recorded from almost all of the coffee-growing countries. It has been reported from East and South Africa, Uganda, Seychelles, India, Mauritius, Ceylon, Java, Samoa, Hawaii, Brazil, Barbados, Guadeloupe, and the Virgin Islands. It was reported as present in both St. Thomas and St. Croix in 1920. In Porto Rico it has been observed on Arabian and Excelsa coffee, orange, and gardenia in addition to the plants named above. Numerous other host plants are known. It has been regarded as a very serious enemy of coffee. In Ceylon it was considered as one of several factors responsible for the abandonment some forty years ago of thousands of acres of coffee. There it was said to have taken only four years to cover the entire island, and a similar rapidity of spread has been noted elsewhere.

The green scale is of pale lemon-green<sup>color</sup> and has an irregular line or loop of blackish spots on the back. The insect is oval in shape, flat, and ranges in size from very small to between 1/16 and 1/8 inch in length. It is found fixed to both upper and lower leaf surfaces, particularly along the midrib of the leaf, and to the branches and young fruits.

The planter's attention is first directed to the infestation by the covering of sooty mold over the branches, leaves, and fruits. This mold has developed in the saccharine substance or honey dew emitted by the insect, and affects the plant chiefly through reducing the amount of light which reaches the leaves, a minor matter in comparison with the great damage to the plant done by the feeding of the insects which live on the sap, sucking this from leaves, stems and fruits, draining the vitality from the plant and killing tissues in the process.

The scale infestation is apt to be heaviest in the latter part of the dry season, at which time the coffee crop is most susceptible to injury. Many buds drop unopened, and there is presumably considerable loss in young fruits attacked by scale.

In countries where the green scale is found, various insect parasites have helped hold it in check, but its most important enemies have been fungi. Two fungi have already been observed on it in Porto Rico, one of which has been identified by the junior writer, as Cephalosporium lecanii, Zimm. This has effected wholesale destruction in some instances. The presence of this fungus is made conspicuous by the white moldy appearance of the dead insects. A damp atmosphere favors the fungus. It is possible that with adequate shade and a normal rainy season this fungus will furnish sufficient control.



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Two methods are suggested for combating this scale: the first, artificial inoculation of the scale with the fungus during the rainy season; and the second, spraying with a contact insecticide in the dry weather.

The first process is as follows:

The fungus which attacks and kills the green scale is a microscopic plant which enters the body of the insect, probably through its breathing pores. The fungus branches and grows all through the scale, finally causing its death. The fungus reproduces by the production of tiny seed-like bodies known as spores, on the exterior of the scale. These spores and the branches on which they are borne give the dead scales their white, woolly or mealy appearance. Thousands of spores are borne on each scale.

The spores germinate under moist conditions by the formation of a slender thread-like organ which may enter and eventually kill any scale with which it comes in contact.

The fungus may be used to combat the green scale during wet weather. Dead scales covered with the white fungus should be scraped off into water, and shaken violently with the water to dislodge the spores.

The water containing the spores should be sprayed onto the upper branches of scale-infested trees. Only a small amount is needed for each tree and a small hand-sprayer is sufficient. In case the scales cause the sprayer to clog, the mixture of scales and water may be strained through coarse cheesecloth. The fungus spores are small enough to pass easily through the meshes of the cloth.

Spreading the fungus by this method is useless in dry weather. The spores require water to germinate and are quickly killed by drying. The spraying should be done late in the afternoon following a shower while the leaves are yet wet.

Should a sprayer not be obtainable, leaves with diseased scales may be tied among the top branches of infested trees. The spraying method will probably prove much more valuable especially in combating the scale in seedbeds.

It must be remembered that the fungus cannot be expected to assist in controlling the scale in dry weather.

Where control through beneficial fungi proves insufficient, the plants should be sprayed with a paraffine-oil emulsion. Directions for preparing this will be furnished on request.

The future livelihood and prosperity of many Porto Rican coffee planters are dependant on the coffee nurseries already established from the last crop or to be planted from the present crop. It is essential that the trees in these nurseries be kept free from diseases and insects in so far as this may be done. The green scale, already present in some private nurseries, is capable of doing great damage to young coffee plants, rendering them not only unsuitable for planting but dangerous foci of general infection. Each planter should see that his nursery, first of all, is free from scale.



